



Blue Force Tracking — Combat Proven

by Captain James Conatser and Captain Thane St. Clair

"The single most successful C2 system fielded for Operation Iraqi Freedom was the Force XXI Battle Command Brigade and Below-Blue Force Tracking (FBCB2-BFT) system. It is important to mention that the FBCB2 system used during this operation was not fielded to facilitate division command and control, but rather to facilitate tracking of friendly forces at echelons above division. Even so, BFT gave commanders situational understanding that was unprecedented in any other conflict in history."

— 3d Infantry Division (Mech)
Operation Iraqi Freedom After Action Report

Force XXI Battle Command Brigade and Below (FBCB2) is a digital command and control (C2) system for brigade and below platform application. FBCB2 is part of a larger Army post-Desert Storm initiative to digitize C2 across the force, known as the Army Battle Command System (ABCS).

FBCB2-BFT is a satellite-based version of the terrestrial based FBCB2-enhanced positioning location and reporting system (EPLRS). FBCB2-BFT was quickly developed, tested, and fielded to Operation Enduring Freedom and Operation Iraqi Freedom units to satisfy the U.S. Army Central Command (CENTCOM) commander's operational needs statement for friendly forces' situational awareness (SA) in preparation for operational plan (OPLAN) 1003V in the fall and winter of 2002.

In the 6 months prior to 21 March 2003 (G-Day), the Army undertook an enormous effort to develop, procure, and field FBCB2-BFT to the U.S. Army, the U.S. Marine Corps, and Brit-

ish forces identified to potentially deploy to both Kuwait and Afghanistan. This effort included the rapid development of the system, diversion of previously produced FBCB2 systems designated for fielding to III Corps units, and accelerated production of systems to fulfill the huge operational requirement.

Standard FBCB2 hardware and software would be used, but an entirely new satellite transceiver and communications network had to be developed, tested, produced, distributed, and installed. The training plans for units deploying had to be modified based on time available. Finally, the installation of systems in vehicles and the actual training of soldiers had to occur; all of this would be in direct competition with what the designated units already had to accomplish within their deployment timelines.

The 2d Brigade Combat Team (BCT), 3d Infantry Division (ID) was deployed to Kuwait in September and October 2002 for Operation Desert Spring (formerly Intrinsic Action) and was the first unit to receive FBCB2-BFT. What followed was an unprecedented fielding of FBCB2-BFT systems on Army prepositioned stocks (APS) and unit platforms in theater, as well as on unit platforms at home station. This resulted in simultaneous installation of more than 1,000 systems on three continents, spanning six countries, including 20 states within the United States, and involving more than a dozen Army, joint, and coalition units. Throughout this process, over 4,000 soldiers were trained. The system was provided to the 3d ID (M); 1st Armored Division; 101st Air Assault; 82d Airborne; 2d Light Cavalry Regiment; 3d Armored Cavalry Regiment; 173d Airborne Brigade; 3d Brigade, 4th ID (M); 75th Exploitation Task Force; 11th Aviation Brigade; 12th

Aviation Brigade; 1st Marine Expeditionary Force (MEF); and the 1st United Kingdom Armoured Division, as well as selected V Corps and Coalition Forces Land Component Command (CFLCC) platforms and command posts. (Figure 1) Installation and training sites ranged from the comfort and convenience of unit motor pools and staging areas in the Continental United States and Germany, to the austere conditions of company-level forward operating bases found along Afghanistan's border with Pakistan.

To incorporate this new capability into the receiving units, the TRADOC System Manager (TSM) XXI provided briefings to senior commanders and staffs, developed and distributed an FBCB2 user's tactics, techniques, and procedures (TTP) pocket guide, and provided over-the-shoulder training to units at home station and in theater. These key leader briefings and TTP handbooks contributed to understanding the system's capabilities and limitations, which became very useful on the road to Baghdad.

New equipment training consisted of three courses; an abbreviated Operator's New Equipment Training (OPNET) course with 8 hours classroom instruction; a Digital Master Trainer's Course (DMTC) with 11 days of classroom instruction; and a Unit-Level Maintainer's Course (ULMC) with 3 days of classroom training.

The Difference Between FBCB2-EPLRS and FBCB2-BFT

Currently, Army units are using two FBCB2 baselines: the original EPLRS radio-based FBCB2 (FBCB2-EPLRS) found in III Corps units (4th Infantry Division and 1st Cavalry Division) and Stryker Brigade Combat Teams (SBCTs), and the recently developed satellite communication (SATCOM)-based FBCB2-BFT.

The two baselines are not fielded to the same density. An FBCB2-EPLRS-equipped division has approximately 2,600 systems, whereas an SBCT has approximately 700 systems, practically one on every platform. Therefore, the Blue Force common operational picture (COP) is very complete. In comparison, an FBCB2-BFT-equipped heavy division during Operation Iraqi Freedom had approximately 150 systems. The FBCB2-BFT equipped division distribution only provided systems to key-leader platforms down to company level, primarily in maneuver units. Additionally, select C2 nodes ranging from maneuver battalion command posts to the CFLCC's Headquarters and the early entry command post (EECP), were also equipped. Thus, the Blue COP in these units, although useful, is less comprehensive than in Force XXI units.

In FBCB2-EPLRS-equipped units, radio-based communications rely on a denser fielding of systems and good dispersion of platforms throughout the area of operations to maintain network integrity. Wide dispersion and line-of-sight limitations between vehicles affects the terrestrial-based radio network and the effectiveness of SA and C2. FBCB2-BFT literally breaks the line-of-sight barrier with its satellite link; distance, dispersion, and line-of-sight between vehicles is not a problem.

FBCB2-EPLRS is accredited to process both unclassified and secret information. It can be operated in either an "unclassified" or a "secret" mode using individual or unit password access. This capability is required to connect to the secret-high ABCS. Thus, FBCB2-EPLRS is interoperable with the tactical operations center (TOC) ABCS systems. Currently, FBCB2-BFT is not accredited for secret information, because of the commercial satellite link and therefore, it is not currently interoperable with the TOC ABCS systems. However, it does provide a one-way feed of Blue locations to the Army-level Global Command and Control System-Army (GCCS-A) through a "trusted guard,"

OEF/OIF BFT Fielding

Over 1200 BFT/FBCB2 installs completed in 6 countries and over 20 states covering OIF Joint and Coalition Ground and Aviation Platforms

UNITS	BFT PACKAGES		TOTALS
	GROUND	AVIATION	
JTF180	176	41	217
V CORPS	29	8	37
3D ID	150	6	156
1ST MEF	200	0	200
101ST AAD	68	88	156
1ST AD	153	15	168
3D ACR	47	10	57
4TH ID	43	0	43
UK	47	0	47
75TH FA	18	0	18
173D ABN	90	0	90
TOTAL	1,021	168	1,189

Figure 1

which populates the COP and disseminates the blue picture back down through TOC systems to brigade level. The information passed over SATCOM is encrypted and considered by some to be "secure." However, it has not been "Type 1" communications security certified and, therefore, is not authorized to process secret information. This shortcoming has been identified as being critical and solutions are being researched to correct this deficiency.

FBCB2-EPLRS allows the user to determine how often his platform location is reported to other systems. Users can set both time and distance triggers for sending position reports. The time setting ranges from 10 seconds to one hour, while distance can be set from every 50 to 2,500 meters. For FBCB2-BFT, this update rate is set at 5 minutes and 800 meters for ground platforms, and every minute or 2,300 meters for air platforms. A server collects these platform-position reports and transmits a network-wide message, with position updates, every 5 minutes for ground and every minute for air.

Both systems give leaders the ability to see and manage reported enemy situational awareness (RED SA); however, correlated enemy SA via the TOC all-source analysis system is not possible with FBCB2-BFT due to the lack of ABCS interoperability.

While there are some differences between the two versions of FBCB2, many of the capabilities are identical. Some of the most valuable tools found in both systems are the navigational and map tools. Both systems use global positioning systems (GPS) for platform location, which updates continuously in real-time. Both systems have the same mapping capability to load a variety of military map or imagery backgrounds with underlying digital terrain elevation data (DTED). Maps on both systems are scalable and possess the zoom-in/zoom-out capability. Both versions have the ability to create, save, analyze, and send routes to other platforms. Both systems have point-to-point and circular line-of-sight terrain analysis tools. Lastly, both systems can be locally or remotely challenged and destroyed, if compromised, by erasing the computer hard drive.

System Performance During OEF/OIF

"I fought in combat with a very good digital battle command system that had some minor problems. Based on my experience,

I am convinced that digital battle command is the key to success in current and future conflicts. ... We need to embrace digital battle command and recognize its importance in twenty-first century warfighting"

— LTC John W. Charlton, Commander,
Task Force 1-15 Infantry, 3ID(M)

"You are focused [With FBCB2-BFT]. You have just reduced layers of friction, and the fog of war is why units lose. This is simultaneous, real-time synchronization. It reduces the friction of war about a hundredfold."

— CPT Stewart James, Commander,
A Company, 2d Battalion, 69th Armor

FBCB2-BFT provided Operation Enduring Freedom and Operation Iraqi Freedom commanders and units a remarkable capability that greatly enhanced their combat effectiveness — abilities to navigate under limited visibility conditions, to move rapidly over great distances and synchronize their movement, and to communicate both vertically and horizontally over extended distances. While after action report comments continue to flow from the field, leaders and other users have consistently praised the system for the capabilities it provided them during combat.

Commander's initial confidence in the system varied. This is understandable, given that on the eve of going to war, with the ultimate responsibility for the lives of soldiers on their shoulders, commanders were issued yet another new piece of equipment. It was difficult to embrace a new system and discard tried-and-true practices with which they and their units were familiar and confident. In some cases, units were forced to accept, and came to rely on, FBCB2-BFT when traditional equipment and accepted practices proved insufficient during the campaign.

During Operations Enduring Freedom and Iraqi Freedom, the level of FBCB2-BFT's effectiveness and individual unit "digital learning curves" varied after receiving the system. Units that quickly embraced the new technology and placed command emphasis on its training and employment, benefited early on in the campaign. Others that either received the capability at the last minute or did not quickly embrace it, were forced to adjust during the conflict.

The most lauded capability was the blue SA. The blue SA picture provided to commanders and command posts significantly enhanced battle and unit tracking, and greatly reduced frequency modulation/tactical satellite radio traffic. This gave unit leaders more confidence when making tactical decisions and more time to focus on fighting the enemy. Despite the 5-minute icon update latency, commanders were better able to track the execution of their intent and synchronize the movement of their forces with FBCB2-BFT. Commanders and units at every level viewed the exact same blue picture throughout the entire war in near real time. This is the first time since the Napoleonic Era that commanders were able to "see" their forces on the battlefield.

Map and navigational features provided by FBCB2-BFT helped units move and maneuver from the Kuwaiti border to Baghdad in record time. Many BFT users stated that they stowed their paper maps (13 different map sets from one 3ID account) in the bustle rack of their vehicle shortly after line of departure. Operations Iraqi Freedom units were provided numerous digital maps, covering the entire country of Iraq at multiple scales. These in-

cluded 5-meter controlled-image base imagery, 1:50K and 1:250K military maps, and digital terrain elevation data maps — all changeable with a touch of a button.

Armed with these digital maps and the presence of a GPS-generated "own" icon, FBCB2-BFT users could navigate and maneuver their forces without having to stop and switch map sheets and replace graphics, which are also computer generated and scalable with the map background. Many soldiers claim that if it were not for FBCB2-BFT, they could not have navigated through the almost-zero visibility conditions caused by dust storms early in the campaign. Other soldiers have commented on its effectiveness in urban terrain while conducting missions, such as the "Thunder Runs," into Baghdad.

The fact that FBCB2-BFT reduced fratricide is also a common theme in feedback from the users in combat units. Anti-fratricide has never been a component of FBCB2, especially in the context of such a thin fielding and the 5-minute latency of platform positions. However, due to the increased SA of commanders and their staffs, a reduction in the numbers of blue-on-blue incidents appears to have been a secondary effect. It was also used in the clearance of indirect fires and to facilitate link-ups between units, which did occur between the 3d Infantry Division and 1st Marine Division in An Nasiriyah and Baghdad.

Despite many complaints about satellite bandwidth limitations, the C2 and email-like messaging capabilities were still touted as "heros of the battle" in many instances. This was particularly true for the Combined Joint Task Force 180 forces that were located at fixed sites spread across great distances in the rugged terrain of Afghanistan. Operating under extremely poor line-of-sight conditions, FBCB2-BFT provided units with an extremely reliable back-up communications mechanism and a means to keep routine administrative and logistics traffic off the very limited tactical satellite voice frequency. The messaging capability did the same for units in the Iraqi theater on the road to Baghdad. These units passed critical C2 information, fragmentary orders, and overlays over great distances with great success. This is especially important considering that maneuver and logistics elements were separated, at times, by hundreds of kilometers.

One of the chief complaints from FBCB2-BFT users is that the system was fielded too thinly among their units. The primary reason for this thin fielding was the limited availability of hardware and time. The Army was forced to develop the "thin" distribution plan based on approximately 1,000 systems already available in the timeframe allocated.

The Future of FBCB2-EPLRS and FBCB2-BFT

"Perhaps the greatest limitation of BFT was its limited distribution."

— 3 ID (M) Operation Iraqi Freedom After Action Report

Prior to the war in Iraq, FBCB2-EPLRS was projected for upgrades in capability and user functionality. Since the onset of Operations Enduring Freedom and Iraqi Freedom and the development of FBCB2-BFT, the program has drastically expanded, reaching units that were never projected for digitization or that were not scheduled for fielding until years from now. User feedback from Force XXI units, the SBCTs, and Operations Enduring Freedom and Iraqi Freedom units continue to assist in guiding FBCB2 combat and material developers to improve the system.

Several issues and ideas have been generated from soldiers who used the existing system in battle. Among these issues to be considered for development for future implementation are: increased bandwidth or lifting the 576-byte message size limitation; adding a print capability for maps, overlays, messages, and orders; enhanced overlay construction tools; increased drag-and-drop style functionality; enhanced email-like messaging capability; and a more user-friendly data base.

Operation Iraqi Freedom has also reinforced the need to fulfill a pre-existing requirement for a handheld material solution with the same functionality found in FBCB2-BFT for dismounted operations. There are a number of handheld prototypes under development; however, none yet have fulfilled the capabilities requirement.

Recent technological advances have allowed for reducing the size and weight of the handheld prototype and producing a product that does not excessively increase the weight of the individual soldier's load. The solution must have FBCB2 software to be truly interoperable with our platform-based FBCB2-BFT systems. Additionally, the requirement to bring SA and navigation tools to the pilots of rotary wing aircraft has been reinforced. A prototype that consists of a remote screen kneeboard connected to an FBCB2-BFT central processing unit is under development. Both prototypes should be provided in small quantities to select units later this year or in early 2004.

Software improvements for FBCB2 are scheduled for release in December 2003 and in February 2004. The first software improvement was originally designed to fix current software shortcomings found in the SBCTs, but has significantly expanded to incorporate user feedback as well as faults identified during Operation Iraqi Freedom.

Major improvements that will affect both FBCB2-EPLRS and FBCB2-BFT-equipped units are: L-Band/EPLRS two-way SA interoperability; hierarchical database for FBCB2-BFT units; and increased message size for C2 messages and overlays. This version of software will also be the baseline software tested in February and March 2004 to achieve a full-rate production decision for FBCB2.

"The bottom line is that digitization across the breadth of the Army is necessary to maintain information superiority and achieve information dominance over our potential adversaries. Capabilities, such as FBCB2-BFT and similar technologically advanced war fighting systems, saved lives in our most recent conflict and enabled mission success in record time."

The second software improvement will include: an enhanced situational report/platform status functionality; automated "trigger-pull" engagement report that will generate SA; enhanced situational awareness capabilities such as the ability to report/modify battle damage assessment of icons to reflect a destroyed or disabled status; enhanced operation orders and overlay processing; L-Band to EPLRS C2 messaging capability; and interoperability with ABCS.

TSM XXI is leading an effort known as FBCB2 Course of Action (COA) 3.1.1 to expand the original fielding plan of FBCB2-BFT down to platoon leader and platoon sergeant levels in vir-

UNITS	3.1.1 FBCB2 FIELDING PLAN			TOTALS
	W/EPLRS	W/BFT SATCOM	AVN	
I CORPS	0	123	7	130
III CORPS	256	801	18	1,075
V CORPS	0	222	19	241
XVIII CORPS	0	216	33	249
1ST ID	0	946	22	968
1ST AD	0	946	22	968
1ST CD	2,478	0	50	2,528
2D ID	706	711	22	1,439
3D ID	748	198	22	968
4TH ID	2,478	0	50	2,528
10TH ID	0	401	35	436
25TH ID	1,412	288	35	1,735
82D ABN DIV	0	509	39	548
101ST AASLT	0	553	93	646
2D LCR	706	0	41	747
3D ACR	710	0	41	751
172D SIB	706	27	0	733
173D ABN BDE	0	90	0	90
56TH BDE 28ID	706	0	0	706
SOF	0	1,416	0	1,416
TOTAL	10,906	7,447	549	18,902
# Unresourced until Objective Force Fielding				

Figure 2

tually every division in the U.S. Army. This places approximately 1,000 FBCB2-BFT systems in a standard armor or mechanized division and approximately 500 in light infantry divisions. COA 3.1.1 also allocates approximately 1,400 systems to Special Forces, civil affairs, psychological operations, and Ranger battalions. (Figure 2.) Fielding Plan 3.1.1 was approved by G3, Headquarters, Department of the Army (HQDA), April 2003 and resourced by G8, HQDA in the 2005-2009 POM.

The bottom line is that digitization across the breadth of the Army is necessary to maintain information superiority and achieve information dominance over our potential adversaries. Capabilities, such as FBCB2-BFT and similar technologically advanced war fighting systems, saved lives in our most recent conflict and enabled mission success in record time. Our path to victory lies with our leaders and the tactical competences of our soldiers and ability to leverage technology to fight and win decisively.



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CPT Thane St. Clair is an acquisition officer assigned to TSM XXI, Fort Knox, KY. He was deployed to Afghanistan from January through April 2003 to assist in fielding and training the FBCB2-BFT to CJTF 180 and 1st Brigade, 82d Airborne Division. He is currently in Afghanistan, where he is assisting in fielding and training the FBCB2-BFT to the 1st Brigade, 10th Mountain Division.